95TH PERCENTILE OF TROPONIN T FOR GIVEN SERUM CREATININE, AGE AND SEX AS A POTENTIAL CLINICAL TOOL FOR EVALUATION OF MYOCARDIAL INJURY IN PATIENTS WITH KIDNEY DISFUNCTION.

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Background: High sensitivity cardiac troponin T (TnT) is the biomarker of choice to detect myocardial injury. Staging of renal disease, both acute (acute kidney injury, AKI) as well as chronic kidney disease (CKD) is based on glomerular filtration rate (GFR) – parameter mainly built on serum creatinine. Following the ACC guidelines for NSTEMI, elevated TnT in patients with preserved renal function may lead to a diagnosis either of myocardial infarct or heart disorder without ischemia. But in the event of kidney disease, where a positive relationship between biomarkers of kidney function (creatinine) and myocardium cell injury (TnT) is well known, the clinical significance of elevated TnT in patients with elevated creatine remains unsettled and make diagnosis of myocardial infarct in patients with CKD or AKI challenging.

Objectives: The aim of the study was to confirm the relationship between high sensitivity TnT and serum creatinine in unselected cohort of patients in internal medicine ward. Consequently we resolved to computationally present this relationship between both biomarkers in all portion of TnT distribution by means of quantile regression method, develop the formula for calculation of high (95^{th}) percentile for TnT for given creatinine, age in both sexes, and describe the effect of TnT elevation on early morbidity in the analysed group.

Material and Methods: 2034 records of serum creatinine, TnT, age and status at the discharge (deceased or alive) from patients hospitalized in the Department of Internal Medicine, Nephrology and Diabetes (Łódź, Poland) were collected. Due to high variability and dynamics of TnT, patients with MI diagnosed were excluded from the study. Data were analysed with the use of ordinary least squares (OLS) regression, quantile regression (QR), and Student t test.

Results: Log-log-linear relationship was noted between the analysed biomarkers in both: OLS [Figure 1] and QR [Figure 2]. QR lines in all of the analysed percentiles (from 5^{th} to 95^{th}, by 5), except 95^{th} percentile, were parallel (p = 95%). Based on QR we developed the formula for calculation 95^{th} percentile of TnT (in ng/L), given serum creatinine (in µmol/L) and age for men and women: $TnT_{Q.95} = 10 \wedge (\beta_0 + \beta_1 \cdot \log_{10} \text{Creatinine} + \beta_2 \cdot \text{Age})$, where: $\beta_0 = 0.30276816$ for men, 0.994060725 for women, $\beta_1 = 0.94167697$ for men, 0.386713751 for women and $\beta_2 = -0.00147316$ for men; 0.004461049 for women. TnT levels were significantly higher ($p < 0.05$) in patient with unfavorable hospitalization course.

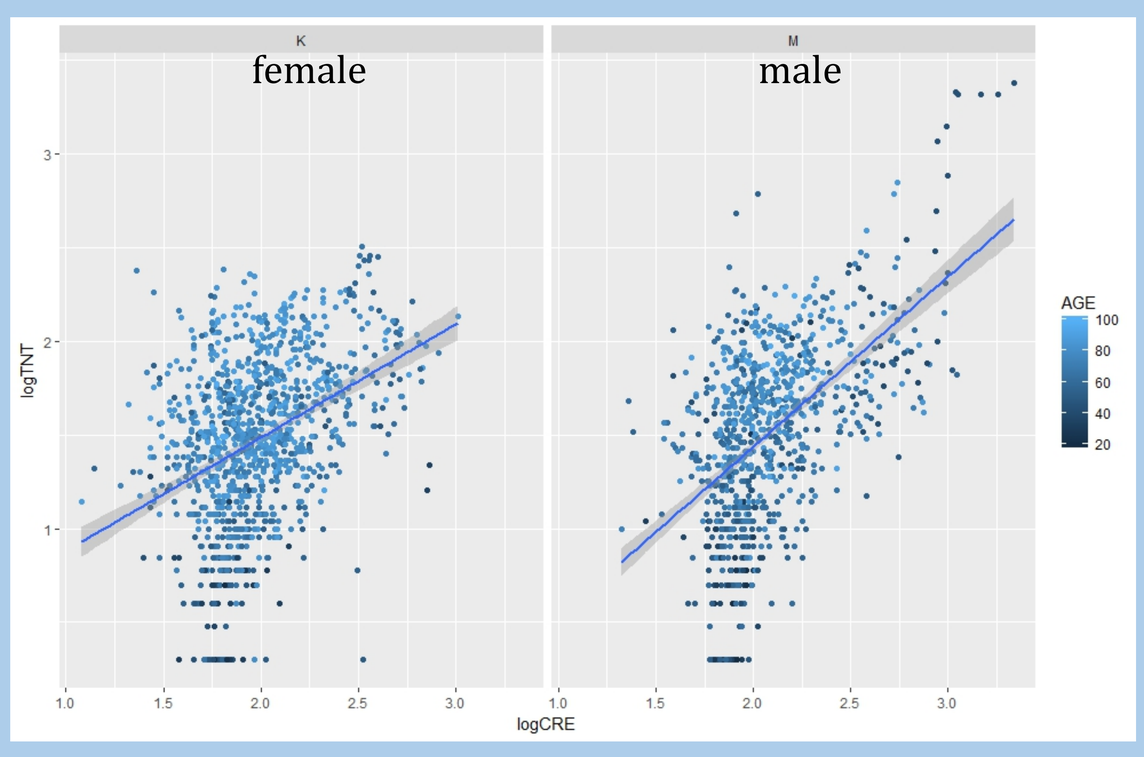

Figure 1. Ordinary least squares (OLS) regression

Figure 2. Quantile regression (QR)

Conclusions: We confirmed the log-log-linear relationship between serum creatinine and TnT in unselected cohort of patients from internal medicine ward. Assumption of existence of at least two components forming TnT levels offers convenient interpretation of QR lines parallelity. Of these two components one is dependent on creatinine concentration (kidney function biomarker), and the other is a manifestation of background myocardium dysfunction. We assume that QR might become a practical tool to stratify patients with kidney disease and myocardial dysfunction for further diagnostic assessment.

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